

BOOK REVIEW

NEW ADVANCES IN MODAL SYNTHESIS OF LARGE STRUCTURES,

edited by L. Jezequel, Balkema, Rotterdam, 1997, No. of pages: 588.

This book, subtitled 'Non-linear Damped and Non-deterministic Cases', contains 49 papers presented at COMMET '95, also known as International Conference MV2, held in Lyon, France in October, 1995. Most of these papers, 26, are authored by French engineers or researchers, and all but two are written by European authors (39 from Western Europe and 8 from Eastern Europe). Thus, this volume reflects the European, specially French, experience in these specialized methods of structural dynamics.

The book is divided in seven chapters entitled: substructuring and modal synthesis (containing 11 papers), modal identification (7), updating of finite element models (5), vibroacoustic analysis (11), non-deterministic analysis of structures (3), non-linear analysis (7), and non-linear identification (5). Of these papers, there are three dealing with subjects that may directly be of interest to the readers of this journal. In effect, one paper presents the evaluation of the global dynamic moduli of an arch dam (Jidoaia Dam in Romania) by calibrating a finite element model (that considers rock foundation-dam interaction) on the basis of the recorded dam structural response to shocks and vibrations. A second paper presents the dynamic stiffness method for predicting the vibration response of large and infinite structures modelled by finite elements and including the interaction with piles and buildings. The method is verified using measurements from the vibration of a 12-storey, base-isolated building above a London underground station. Another paper presents a study of the expected frequency response of a rigid body on a Winkler's foundation excited vertically at the base of a spring layer with random density to account for the heterogeneity of the soil medium.

In the remainder of the book (a brief description follows), the authors present and apply theories

and methods that can be relevant to geomechanics; in particular, but not exclusively, to non-linear soil-structure interaction and wave propagation. In Chapter 1, a number of Rayleigh-Ritz discretization (mainly substructuring and hybrid) techniques are presented, in two papers mathematically, and in the rest succinctly to devote more space for applications, mostly in mechanical and electromechanical engineering. These techniques are used to reduce the size of problems defined in large physical domains, thus yielding numerically efficient solutions. In Chapters 2 and 7, several parameter identification approaches and experimental verification techniques are presented for linear and non-linear systems, and mainly applied to simple cases involving spring-mass-damper configurations with few degrees of freedom for which their dynamic characteristics are obtained. Chapter 3 deals with error localization and updating of finite element meshes, and Chapter 4 deals with mechanical and acoustic vibrations. These chapters present applications to structures such as rods, trusses, shells, aircraft and naval components, double-panel partitions, layered-solid and liquid crystals, circuit boards and supporting elements, railways tracks, and rotating machinery components. Chapter 5 deals with statistical treatments for modal and boundary element formulations. And, Chapter 6 presents a mix of papers dealing with non-linear dynamic behaviour of systems, including a review of modal modelling for systems with isolated non-linearities and a study of the hysteretic bilinear inelastic behaviour of reinforced-concrete beams.

FRANCISCO MEDINA
PO Box 191594
San Francisco, CA 94119
U.S.A.